

Chapter 3

Conclusions

June 2020

This chapter should be cited as

ERIA and BNERI (2020), 'Conclusions', in ERIA and BNERI, *Brunei Darussalam Energy Consumption Survey: Residential and Commercial and Public Sectors*. ERIA Research Project Report FY2019 no.03, Jakarta: ERIA, pp.47-49.

Chapter 3

Conclusions

This report presented the results of the energy consumption survey of the residential and commercial and public sectors in Brunei Darussalam, and outlined policy options to improve energy efficiency in the residential sector and energy performance of commercial and public sector buildings. Despite the survey limitations, the study provides baseline information on the level of energy consumption in these sectors.

The key results of the residential survey are the establishment and determination of (i) the breakdown of energy consumption by end use, (ii) the average consumption per end-use appliance or equipment, and (iii) the savings potential.

Amongst residential energy end uses, air conditioning accounted for the highest share at about 60% of household electricity consumption, followed by refrigeration (18%), lighting (7%), and water heating (6%). Air conditioners were the most energy-intensive equipment, with average consumption of about 2,600 kWh per unit per year, followed by water heaters (1,149 kWh), refrigerators (947 kWh), rice cookers (357 kWh), and TV sets (239 kWh). Energy consumption by outdoor lighting equipment amounted to 128 kWh per unit per year whilst washing machines consumed 72 kWh per unit per year. Indoor lighting equipment was the least energy intensive, with 41 kWh per unit per year. Electricity savings could be achieved by replacing technologies with the most efficient ones. About 73 GWh or 5.3% of household electricity consumption could be saved if the four appliances were replaced with more efficient ones.

The building survey established indicative energy performance of the various categories of commercial and public buildings using BEI (kWh/m²/year) as the assessment criteria. Amongst the building types included in the survey, 4–5-star hotels had the highest average intensity at about 371 kWh/m²/year, followed by large hospitals with 334, large mosques with 323, and retail buildings with 308. Large office buildings had a BEI value of 275 kWh/m²/year, medium-sized offices 227, and small ones 242.

In general, these BEI values are much higher than the target BEI values under the green building certification schemes in Malaysia and Singapore. (The comparison is made with Singapore and Malaysia since Brunei Darussalam does not have a national green building rating scheme yet.) The survey showed that savings opportunities exist since the current BEIs of buildings in the country are much higher than the more efficient ones in neighbouring countries. The comparison is considered valid since Brunei Darussalam and its neighbours have similar climatic conditions.

The main challenge for Brunei Darussalam is how to realise and reap the benefits of energy-saving potential in the residential and commercial sectors. This study identified measures

arranged in three timeframes that could be pursued by the government to improve energy efficiency (Table 3.1).

The action plans in Table 3.1 could simultaneously target the residential and commercial and public sectors. The government has already carried out studies and implementation plans for energy efficiency labelling and MEPS for electrical appliances. The launching of a MEPS programme would benefit the residential and commercial sectors since household and office electrical appliances are mostly identical. But energy efficiency labelling takes time to become mandatory; regulations must be applied, and an inspection laboratory set up to test the power rating of appliances. The introduction of the above measures must be accompanied with information and awareness campaigns to increase the programme recipient coverage and reach. These measures could be implemented in the short term.

Other measures that could be introduced in the short term for the building sector are the benchmarking study and capacity building. The benchmarking study (chapter 2) is data collection and could be launched as soon as possible to create the basis for further policy measures. ME has already initiated capacity building for building energy auditors and an energy management system. These could be gradually increased in the short term and sustained in the long term.

Table 3.1: Energy Efficiency Improvement Action Plans

Time Horizon	Residential	Commercial and Public Sector Buildings
Short Term	<ul style="list-style-type: none"> • Technical guidelines for passive measures • Minimum energy performance standards • Information and awareness campaign 	<ul style="list-style-type: none"> • Technical guidelines for passive measures • Minimum energy performance standards • Information and awareness campaign • Benchmarking study • Capacity building to increase the number of energy managers
Medium Term	<ul style="list-style-type: none"> • Standards and labelling system for appliances • Building energy intensity labelling for commercial and public buildings • Technical guidelines for active measures 	<ul style="list-style-type: none"> • Technical guidelines for active measures • Expansion and implementation of the green building ratings scheme • Setting up energy efficiency and conservation laws
Long Term	<ul style="list-style-type: none"> • Home energy management systems • Technology road mapping 	<ul style="list-style-type: none"> • Building energy management systems • Technology road mapping

Source: Author (2019).

In the medium term, the government could introduce technical guidelines for active measures for building energy efficiency. These guidelines could focus on the residential and commercial sectors. The government has introduced a voluntary green building ratings scheme for the public sector. This could be further enlarged to cover the private sector but would need to be made mandatory under EEC laws. However, such policy measures may take time. Therefore, as an interim measure, BEI labelling for commercial and public buildings should be introduced under the MEPS to achieve energy savings in these sectors sooner.

In the long term, energy management systems could be promoted for the commercial and residential sectors (including public buildings). A technology road-mapping study could be undertaken to identify which innovative and advanced but cost-effective technologies could be supported to further improve energy efficiency in the residential sector and building energy performance in the commercial and public sector.